DETERMINANTS OF FULL CHILD IMMUNIZATION AMONG 12-23 MONTHS OLD IN NIGERIA

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Declaration

I, Adebiyi Funmilayo declare that the information presented in this work is a result of true study and it is an original work. Permission was taken and acknowledgement made in cases where other people's idea was used.

Signed on ----------

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ABBREVIATION

ANC	Ante Natal Care
AOR	Adjusted Odds Ratio
BCG	Bacillus Calmette- Guirin
DPT	Diphtheria, Pertussis and Tetanus
DHS	Demographic and Health Survey
NDHS	Nigerian Demographic and Health Survey
EPI	Expanded Program on Immunization
OPV	Oral Polio Vaccine
OR	Odds Ratio
WHO	World Health Organization

ABSTRACT

Although childhood immunization is considered important for improving child survival, most morbidity and mortality in children are due to vaccine preventable diseases such as measles, poliomyelitis, whooping cough, tuberculosis, diphtheria, and tetanus. Globally, immunization coverage has increased during the past decade, but in developing countries including Nigeria, the coverage is still unacceptably low. It is therefore important to recognize the factors that are associated with full child immunization in Nigeria with a view to reduce child mortality in Nigeria and also to make the life of these children better. The study used the 2008 Nigeria Demographic and Health Survey children's data. A total of 4,520 children aged between 12-23 months delivered by 4,520 women aged 15-49 years formed the analysis sample. The dependent variable was full child immunization constructed from a number of variables on uptake of the various WHO recommended immunizations (coded 0 – No and 1 – Yes). Binary logistic regression model was used to identify the critical determinants of full child immunization status.

Results show that only about 22% of the children received full immunization. The significant determinants of full child immunization were religion, residence, place of delivery, antenatal visit, mother's occupation, mother's education, as well as mother's age, household wealth and region of residence.

In conclusion, Full child immunization coverage is low but had increased in Nigeria. The children in households with low income, where the mothers were single, where the mothers were Muslims, where the mothers were without formal education were less likely to be fully immunized. These groups need to be further targeted for a more complete immunization for children.

CHAPTER 1

INTRODUCTION

Childhood immunization is the initiation of immunity through application of vaccine (WHO, 2008). It is considered important for improving child survival (Lee, 2005). This is because more than 10 million children in developing countries die every year because they do not access effective interventions such as immunization that could fight common and preventable childhood illnesses.

Although, about three quarters of the world's child population is reached with the required vaccines, only half of the children in Sub-Saharan Africa get access to basic immunization. Further, in poorer remote areas of developing countries, only one in twenty children have access to vaccination (UNICEF, 2009).

Immunization against vaccination preventable diseases (VPDs) through the expanded programme of Immunization (EPI) is one of the most economical public health interventions available (UNICEF 2002) that contributes extensively to achieving the Millennium Development Goal to reduce the mortality rate of children under five by two-thirds between 1990 and 2015 (UNICEF 2002, World Bank 1993). The expanded Programme on Immunization (EPI) was established in 1974 against six vaccine preventable diseases. These are diphtheria, polio, tuberculosis, measles, pertussis and tetanus. In 2003, DPT3 global coverage was 78 percent with about 27 million children not covered. South Asia and sub-Sahara African countries accounted for 9.9 million and 9.6 million, respectively of the children that were not covered. In most of these countries poor functioning health service delivery system impedes the efforts to meet immunization targets (WHO, 2002). Therefore, children living in remote location and border areas are difficult to

be reached. Other areas not reached were displaced populations. Also, some people lack access to vaccination due to social barriers, lack of information or inspiration to get vaccinated (Fact Sheet WHO/288 March, 2005).

Nigeria started its Expanded Program on Immunization (EPI) in 1979 (NPI, 2001). Reports have shown that the coverage has been fluctuating especially after the global universal childhood immunization efforts ended in 1990. This could have resulted from low political will and social support, inadequate funding and poor community involvement and participation. In view of the important need to improve the efficiency of immunization which was declining so fast and also to meet the universal challenges of immunization, the EPI programme was re-visited and re-named National Programme on Immunization (NPI) in 1995, which probably accounted for observed increase in coverage after the period (17% in 1999, 13% in 2003 and 23% in 2008) (NPI, 2005; 2008).

In 2000, WHO/UNICEF estimated that DPT3 coverage for children between 12-23 months was 23%, polio third dose was 26% and measles containing vaccine (MCV) was 33%. By 2009, the estimates were respectively 42% (DPT3), 54% (Pol3) and 41% (MCV).

Routine immunization coverage in Nigeria is one of the lowest national coverage rates in the world with 38% for January-December 2005 and 50% January- May 2006 (NPI, 2005; 2006). Also, the first round results of a 2006 national immunization coverage survey reported only 18% of children fully immunized aged 12-23 months at survey time (USAID, 2009).

According to UNICEF, the WHO, and National Programme on Immunisation (NPI) guiding principle, in Nigeria a child receives a Bacille Calmette-Guerin (BCG) vaccination for tuberculosis, four doses of oral polio, three doses of DPT (diphtheria, pertussis, and tetanus), and one dose of measles vaccine by age 12 months (UNICEF, 2001). But because children below age two are vulnerable to illnesses due to weak immune system, they are regularly

immunized with booster doses especially of polio and measles during the national or sub-national immunization days.

In Nigeria, vaccination is given on routine and outreach bases. According to the Expanded Programme on Immunization, a routine vaccination schedule for children in Nigeria are given starting from birth, and are being completed before one year of life by all children (WHO and UNICEF, 2008). BCG and OPV0 are administered at birth, while three doses of OPV and pentavalent vaccines (which protect against diphtheria, pertussis, tetanus, hepatitis B and Haemophilus influenzae type B disease) are given at interval of four-week duration; at 6, 10 and 14 weeks, and measles vaccine is given at the age of nine months (WHO, 2008).

Less than half of children have received each of the recommended vaccinations, with the exclusion of polio 1 (67 per cent) and polio 2 (52 per cent) (NPC, 2003). And more than three times as many urban children as rural children are fully vaccinated (25 per cent and 7 per cent, respectively) (NPC, 2003). It is therefore important to study the factors associated with full child immunization in Nigeria with a view to improve the quality of life of these children.

1.2 BACKGROUND OF THE STUDY AREA

Nigeria is located on the West Coast of Africa. It is the most populous nation in Africa with about 146 million people as at 2007 (World Bank, 2008d). It is a federation of 36 polities, plus the Federal Capital Territory, Abuja. Nigeria has more than 250 ethnic groups, with varying languages and customs, creating a country of rich ethnic diversity (Suberu and Rotimi, 2001).

Nigeria has a total fertility rate of 5.43 in 2006 which surpasses that of the entire Sub-Saharan Africa population and is more than twice the world-rate (World Bank, 2008d). It has been suggested that total fertility rate in Nigeria will decline below the average for Sub-Saharan Africa in the coming years by UN projections (United Nations 2007). It is also expected to decline to 3.6 children per woman by 2020-2025 and to 2.4 by 2045-2050 (UN Population

Division 2006). Fertility rates in Nigeria differ by a number of factors. These include natural features and education (UNFPA 2005). The 2003 Nigeria Demographic and Health Survey's data for women ages 15 to 49 exhibits a fertility rate of 4.9 children per woman in urban areas, compared with 6.1 children per woman in rural areas (NPC, 2003).

In 2000, Nigeria's health system was ranked the performance of 187th of 191 countries by World Health Organization. The major challenges facing Nigeria's health system is often at least one of three categories: resources, access, and structure. According to the WHO (2002), most health facilities are poorly equipped and short of essential equipments and staff, while over one-third of rural health facilities lack power supply (World Bank/DFID 2005). Under-5 mortality declined from 206 per 1,000 in 1990 to 191 per 1,000 in 2005, but this is among Africa's slowest declines, and the 2005 figure exceeds the Sub-Saharan average (WHO, 2008). According to the most recent World Bank figures, Nigeria's Infant Mortality Rate in 2010 was 143 per 1,000 live births. While Maternal Mortality Rate as of 2010 was 630 deaths per 100,000 live births (CIA World Fact book, 2013). Inequality by geography, socioeconomic status and maternal education, however, has been observed (UNFPA, 2005). The North East exhibits the highest Infant Mortality Rate of 125 in the regions of the Nigeria, while the South East's Infant Mortality Rate is 66 and this is the lowest in all the regions in Nigeria. Urban and rural areas have Infant Mortality Rates of 81 and 121 respectively. To some extent, this might be explained by an uneven urban-rural distribution of wealth, Infant Mortality Rate among the wealthiest household is 69 but it is at 102 among the poorest quintile. Education could prove another illustrative factor, as Infant Mortality Rate is 71 among infants whose mothers have a high level of education, but 124 among those whose mothers have little or no education (UNFPA 2005). Differential in accessing health facilities may also play a role.

Fig 1: Map of Nigeria

Source: CIA, 2009b

1. 3 PROBLEM STATEMENT

One major way to reduce child morbidity and mortality from common Vaccine Preventable Diseases (VPDs) is immunization. VPDs have caused more than 20 per cent of death for children under five (Lee, 2005). From International comparative data, Nigeria's immunization coverage rates are among the worst in the world (UNICEF, 2001).

According to the 2003 National Immunization Schedule, the percentage of fully immunized children to be targeted was less than 1% in Jigawa, 1.5% in Yobe, 1.6% in Zamfara and 8.3% in Katsina. It was also revealed that only 23% of Nigerian children 12–23 months received all recommended vaccines as at 2008 that is one dose of BCG and measles and three doses each of DPT and polio (NPC, 2008). The same survey showed that 38 per cent of children in Nigeria had not received any vaccinations. As a result, thousands of children are dying as victims of vaccine preventable diseases. In 2009, Nigeria was listed among countries with the

highest incidence of poliovirus cases in the world (WHO, 2010). Routine immunization coverage against Polio and other VPDs were below targets at the national level (WHO Nigeria, 2010). There are quite a lot of reasons for such low rates in Nigeria. Given the protective effect of immunization and the observed low immunization coverage in Nigeria, it is important to identify the factors influencing full child immunization among 12-23 months children in Nigeria so that child mortality and morbidity could reduce.

1.4 RESEARCH QUESTION

What are the determinants of full child immunization in Nigeria?

1.5 OBJECTIVES

General objective

To identify factors associated with full child immunization among children aged 12-23 months in Nigeria.

1.5.1 Specific objectives

1. To estimate full immunization coverage among 12-23 months old in Nigeria by selected characteristics of child, mother and access to health facility.

2. To examine the association between each of the selected characteristics with full child immunization.

3. To identify the predictors of full child immunization in Nigeria.

1.6 JUSTIFICATION OF THE STUDY

It is shown that in countries where about 40% of the children are fully vaccinated, rates of diseases such as polio, measles, mumps, rubella, diphtheria, pertussis (whooping cough), and meningitis caused by haemophilus influenza type B have declined by 95 to 100% (WHO, 2005). It has been noted that diseases cannot be stopped from infecting and causing infants and child mortality if immunization was not received (Bryce et al., 2005). In cases where an

infected child survives, he or she may suffer from chronic health problems for the rest of his life or her life.

Despite the acknowledged benefits of childhood vaccinations, reports have shown that immunization coverage is low in Nigeria. For example, the Nigeria Demographic and Health Survey (2003) revealed that 13 per cent of children aged 12-23 months received all basic vaccinations on time, that is, by the time they were 12 months old (author's calculation).

Several studies have examined issues on child immunization in Nigeria including patterns of uptake as well as determinants (Babalola, 2011; Odusanya et al., 2008; Ayebo and Eregie, 2009). However, these studies have been limited to a selection of the vaccines and often at local geographic areas. Identify the determinants of full childhood vaccination in a representative sample of the Nigerian population is lacking. Identifying the factors that determine full child immunization in a representative sample of the country will enable the government to provide programmes and service environment through well-articulated policies, projects and programmes like National Immunisation Policy and Standards of Practice. This is to ensure increased uptake and ultimately child survival as well as healthy growth of children in Nigeria and enhance their quality of life. It may also suggest a perception on how to improve on current National Programme on Immunization in Nigeria.

1.7 DEFINITION OF CONCEPT

Full immunization

Full immunization is defined in this study as receiving all the required immunization vaccines (i.e. a dose of Bacille Calmette Guerin (BCG), three doses of oral polio (OPV), three doses of diphtheria, pertussis and tetanus (DPT) and one dose of measles by a child by age 12-23 months. Most of these vaccines should ordinarily be completed by 12 months but can be

extended to a period of 23 months. This is because children under 2 years are considered to be at highest risk of serious disease (WHO, 2005).

CHAPTER 2

LITERATURE REVIEW

2.1. EPI TARGET DISEASE AND VACCINES

The EPI has six most common vaccine preventable diseases which to a great extent affects the children. These include tuberculosis, measles, poliomyelitis, whooping cough, diphtheria and tetanus. According to the prevalence of these diseases and resource of the country, other diseases were also added to the EPI program. These include yellow fever and hepatitis. Currently, the EPI administers eight vaccines: BCG (tuberculosis vaccine), oral polio vaccine (OPV), diphtheria-pertussis-tetanus (DPT) vaccine, hepatitis B (HepB) vaccine, measles vaccine, yellow fever vaccine, and heamophilus influenza type b and tetanus toxoid (TT) vaccines. In Nigeria, currently the EPI program has eight vaccine preventable diseases. These are HepB and Hib in addition to the six known EPI program disease.

In Nigeria, vaccination is given on routine and outreach bases. The routine vaccinations services are given starting from birth and should be completed before one year of life by all children.

2.2 FACTORS AFFECTING FULL CHILD IMMUNIZATION

In Malawi, Ethiopia, India, Bangladesh, and the Philippines, a multiregional study that was done showed there was a very significant general demand for better quality of vaccination services (Streefland et al, 1999) and damage was being done to the Expanded Programme on Immunization (EPI) by poor communication between health workers and clients (EPI, 1998). The demand for vaccination was caused by knowledge that vaccines are good for children and/or a strong feeling of exposure to serious illness. A different perspective is that the greatest determinant of vaccination uptake is the perceived quality of vaccination services. The circumstance is likely to differ depending on the environment (Streefland et al., 1999). Knowledge about immunization by parents is poor and the knowledge they have is habitually incorrect (Nichter, 1995). One thing is clear, however, when parents refuse to take their children for immunization, it is because they want to protect their children from being

harmed (Streefland, 2001). In 2003, political and religious leaders in three Nigerian states shunned a polio vaccination campaign by WHO saying that the vaccine caused infertility and AIDS (Jegede, 2007). Also, groups in India (certain Hindu and Muslim) have believed that vaccination is a concealed method of family planning, primarily targeting Muslims (Nitcher, 1995). The better uptake of immunization found among Javanese transmigrants as opposed to Acehnese villagers in the same area was attributed to the former cultural attitudes towards health. Both groups were found to have an the same poor understanding of vaccination and health in general (Raharjo, 1990). Also, people of the Aga Khan in Pakistan were found to be interested in biomedical or western medicine and reasoning despite the fact that they were largely illiterate and have little knowledge of immunization. The impact of high levels of knowledge on subsequent attitudes towards immunization is unknown.

As regards the determinants of full child immunization among 12-23 months old in Nigeria, previous studies done in Nigeria have been particularly limited to a specific area such as regions, states or localities. No study has been conducted on full child immunization which we can apply to the country as a whole. Amongst the studies done locally on child immunization are researches by Odusanya et al., (2008), Babalola (2009), Abdulraheem et al., (2011), Nosayaba (2011) and Kabir et al., (2004). Some of the factors identified in these studies were place of birth, age of the child in months, current age of the mother, marital status, occupation, religion, level of education, number of children, retention of immunization card, place of vaccination, gender, and knowledge score.

The few country-wide studies that have dealt with the issue of child immunization in Nigeria are the descriptive reports of 1990, 1999, 2003 and 2008 NDHS (NPC, 1991, 2000; NPC and ORC Macro, 2008) as well as result from more recent systematic assessments (Policy Project/Nigeria, 2002 and Wonodi et al., 2012). The reports from the four rounds of NDHS conducted in the country revealed broad regional variations in child immunization uptake by

variables such as women's education, child's sex and place of residence, access to health facility.

Turning to the studies that investigated the determinants of child immunization in a more detailed approach, Babalola (2009) used a multi-state survey data conducted in 2004 to identify factors that determine the receipt of full series of diphtheria–pertussis–tetanus vaccines (DPT3) among children aged 12-35 months in the Northern part of Nigeria. But the study failed to include variables that are clearly measured at the community level and such an approach is commonly used in literatures.

From the result, fixed effects of the child's characteristics were statistically independent of maternal characteristics. Also, the odds ratio indicates that maternal characteristics are jointly significant in predicting childhood immunization. Nonetheless, in the model, the age of the mother was the only socio-demographic characteristic that was a significant predictor. In contrast, all the psychosocial predictors included in this model were significant.

The result also showed that children born to young mothers (aged less than 20 years) were least likely to be immunized. The relationship between childhood immunization and maternal education is also significant and indicate that children whose mothers have primary education are less likely to be immunized than those whose mothers do not have any education.

Religion is also a significant predictor of childhood immunization with Islamic religious affiliation being associated with lower odds of immunization.

Household socio-economic status was found to be strongly correlated with child immunization. The data however showed that poor households were significantly less likely to immunize their children compared with wealthier households. Furthermore, living in a household headed by a woman constitutes a significant disadvantage for child immunization.

2.3 DETERMINANTS OF FULL CHILD IMMUNIZATION

Determinants of childhood vaccination uptake still remain complex, and are dependent on various socioeconomic, demographic factors and also supply and demand factors (D'Onofrio and Manfredi, 2010). Supply-related factors are important however, the adequate supply of vaccines does not necessarily translate into children being vaccinated. Several studies suggest that factors associated with vaccination demand/uptake and acceptance are even more complex (Jheeta and Newell, 2008) emphasizing the need to eliminate the unnecessary inequities associated with norms and structural factors that may hinder increased vaccination uptake. Maternal characteristics, sex of child and birth order of the child, place of delivery and antenatal care (ANC) follow up, wealth index, knowledge about vaccination and place of residence could influence immunization coverage among children (New and Senior, 1991).

2.4 CHARACTERISTICS OF THE MOTHER

Characteristics of the Mothers are the most known determinant factors of child immunization. A study done at southern district of Nigeria revealed that mothers with lowest education and unemployed women were less likely to complete a child immunization. Education empowers a woman to access relevant health services, interact effectively and assimilate information relating to prenatal care, childhood immunizations and nutritional needs (Becker et al., 1993). Caldwell (1979) mentioned that maternal education is a significant determinant of child health and no other factor has such impact. Breiman et al., (2004), observed maternal education as the strongest independent factor for protection against childhood mortality. In the study conducted in Ghana by Daniel Buor, (2001) there was an obvious significance in children's vaccination pattern with mother's education level. Jamil et al., (1999) found that mothers who completed at least primary level of education were 1.7 times more likely to have their children fully immunized compared to those who had no education.

It was also indicated that children whose mothers were aged less than 30 years were 2.26 times more likely to be fully immunized (Odusanya et al., 2008). Socio-economic status (particularly education and wealth status) of individuals strongly controls the behaviour of individuals and thereby controls health-seeking behaviour and ultimately child survival (Becker et al., 1993). In addition, higher socio-economic status is associated with better health (Lynch et al., 1996) and this is the same as the study conducted by Antai (2009).

In 2008 NDHS, the data revealed that about 53 % of children in the wealthiest households and 5 % in the poorest household were immunized. Some studies have shown that socio-economic status of the family is an important factor that can influence vaccination compliance with higher socio-economic status being associated with higher uptake of vaccination (Topuzoglu et al., 2005; Cui and Gofin, 2007). In Bangladesh, children of relatively better-off households had an 80% higher chance of being fully immunized compared to the economically disadvantaged group (Jamil et al., 1999). This may be due to the fact that children who are from poor homes find it difficult to be reached by the health services and parents may encounter barriers to reach health facility compared to those of better socio-economic status. Other studies have found no difference in vaccination rates with respect to socio-economic status (Castro-Leal, 1999; Pande, 2003).

Rural–urban inequities in immunization coverage are certainly linked to supply-related factors, e.g. accessibility to vaccination facilities, provision of childhood immunization services, and demand-related factors, such as the knowledge and attitude of mothers (Antai, 2011). About 38% of children in urban areas reported to be more than twice as likely as rural children (16%) to be fully vaccinated (NPC, 2008). The population of Nigeria is largely rural, and the geographical distance of most rural areas tends to influence the availability and effectiveness of immunization campaigns across the country (Antai, 2009).From the NDHS, there have been urban-rural differentials in immunization uptake in Nigeria. Fewer children

in rural areas are vaccinated compared to those in urban areas. The major reason for this could be as a result of limited number of facilities in rural areas. In 2008 NDHS, 38% of children in urban received full immunization compared to their counterparts in the rural areas with 16.2%. From the study conducted in Malawi by Munthali (2007), the percentage of children who were fully vaccinated in urban areas was higher than in rural areas. This is most likely related to the problems of accessing health facilities in rural areas compared to urban areas in Malawi.

Study by Hassan (2005) also found that children living in urban Bangladesh are more likely to complete the immunization schedule than the children living in rural areas. The urban rural inequality in terms of immunization coverage of children is clear, as they are respectively 66 percent and 54 percent for urban and rural in Bangladesh (Mushtaque, et al., 2002).

Also, in studies conducted in Nigeria and Niger, there were urban-rural differences in vaccination coverage. In Niger, 1 in 10 rural children have received all the eight immunizations compared to half of urban children. While the overall vaccination coverage levels in rural areas are less than half of those children in urban areas who had received BCG and measles. In addition, because of higher dropout rates from the health system in rural areas in Niger, coverage levels for the third dose of DPT and polio are less than one-quarter of the rates seen in urban areas (Gage et al., 1997). In Nigeria, rural urban differences in vaccination coverage, though marked, are not as large as those seen in Niger. In the case of BCG and measles vaccines, rural coverage levels are about two-thirds of the levels in urban areas (Reichler et al., 1997) In Eastern Turkey, measles vaccination was found to be higher in urban regions than suburban and rural regions(Altainkaynak et al., 2004).

In a similar study conducted in China by Xie and Dow (2005), as it is with other literatures, household wealth, mother's education and urban city are positively associated with immunization use while the opportunity costs are the barriers to immunization use However,

child's gender is not a significant determinant in the joint cross-sectional model, nor did the results reveal any differential effect of gender between urban and rural areas.

2.5 ACCESS TO HEALTH FACILITIES

Access to health facilities like antenatal care and place of delivery are other factors that are associated with the immunization status of children. Studies indicate that mothers who attend ANC and give birth at health facility are more likely to fully vaccinate their children as antenatal clinic is a means for women to be aware of immunization programme (Mutua et al., 2011; Takum et al., 2011). In a study conducted in Nigeria by Adedayo et al., (2009), most of the mothers interviewed (65.7%) got their awareness of immunization at the antenatal clinics. It is also similar to the study done in Columbia on the uptake, behavioural and attitudinal determination of immunization of hepatitis B among infants which showed that immunization was significantly associated with suggestion from health care practitioners (Big bam et al., 2006).

A study done in Niger Delta area of Nigeria revealed that there was an association between the place of delivery and immunization status of a child (Oyo-Ita et al, 2012). A child born in a health unit was significantly more likely to have been vaccinated with BCG which is given immediately after birth, and to be up to date with their vaccination compared to a child delivered at home (Odiit and Amuge, 2003).

2.6 CHARACTERISTICS OF THE CHILD

Sex of the child can also predict the immunization status of the child in societies where gender inequality is prevalent. For instance in Bangladesh, females are 0.84 times less likely to be fully vaccinated than male children (WHO, 1998). But in a study done in Nigeria in 2009, there was no significant relationship between sex and full immunization status (Antai, 2009). In 2006, the Ethiopian Expanded Programme Immunization survey also showed that no statistically significant difference between girls and boys with regard to their

immunization status (Kidane et al., 2008). In the studies conducted in North India and Nepal, male children were twice as likely to have received immunization as female (Ahluwalia, et al., 1988). Jamil et al., (1999), in spite of almost universal access to immunization services, sex discrimination against female children exists in seeking full immunization coverage in rural areas of Bangladesh. Female children were 30 percent less likely found no significant association between immunization coverage and child's sex (Mahboob, et al., 2000).

Birth order could have a close relationship with vaccination coverage. According to NDHS 2008, vaccination coverage decreases as birth order increases, 27% of first-born children have been fully immunized, compared with 14% of birth order six and above.

Religion is another factor that is likely to determine full childhood immunization in Nigeria (Jegede, 2007). In northern Nigeria in 2003, the political and religious leaders of Kano, Zamfara, and Kaduna States made efforts to stop immunization campaign by discouraging parents from allowing their children to be immunized. This is because they had misconception that it is a plan by outsiders (enemies of Islam) to reduce the Muslim population through fortification of vaccine. Also they thought it is another strategy to transmit HIV virus, which would reduce the population of Muslims. This led to decrease in immunization uptake in Northern Nigeria in 2003 (NPC, 2003).

In Nigeria, another reason by caretakers/parents for their children not to be fully vaccinated could be because of distance to the health. Distance to the health post which is an alternative measure of accessibility has been found to affect immunization coverage in 2006 in Kenya (Ndiritu et al., 2006). Close proximity to the clinic was associated with an increased likelihood of vaccination, with immunization coverage declining with increasing distance from vaccination clinics in Egypt (Reichler et al., 1998) and in Pakistan (Reichler et al., 1997). A possible explanation for this could be that visibility of a clinic may attract a parent's attention and/or act as a reminder to the parent of the immunization status of the child.

In summary, this study draws on existing literatures to identify the predictors of full childhood immunization with the nationally representative survey data collected in 2008. In line with previous studies, it will assess the role of maternal characteristics, child characteristics and access to health facility factors in immunization uptake. In this way, I expect to make a significant contribution to the literatures. Also, this study looks forward to contribute to existing knowledge on child immunization in Nigeria, and informs policy and programmes to improve immunization coverage in Nigeria In this way, I expect to make a significant contribution to the literatures.

2.7 CONCEPTUAL FRAMEWORK

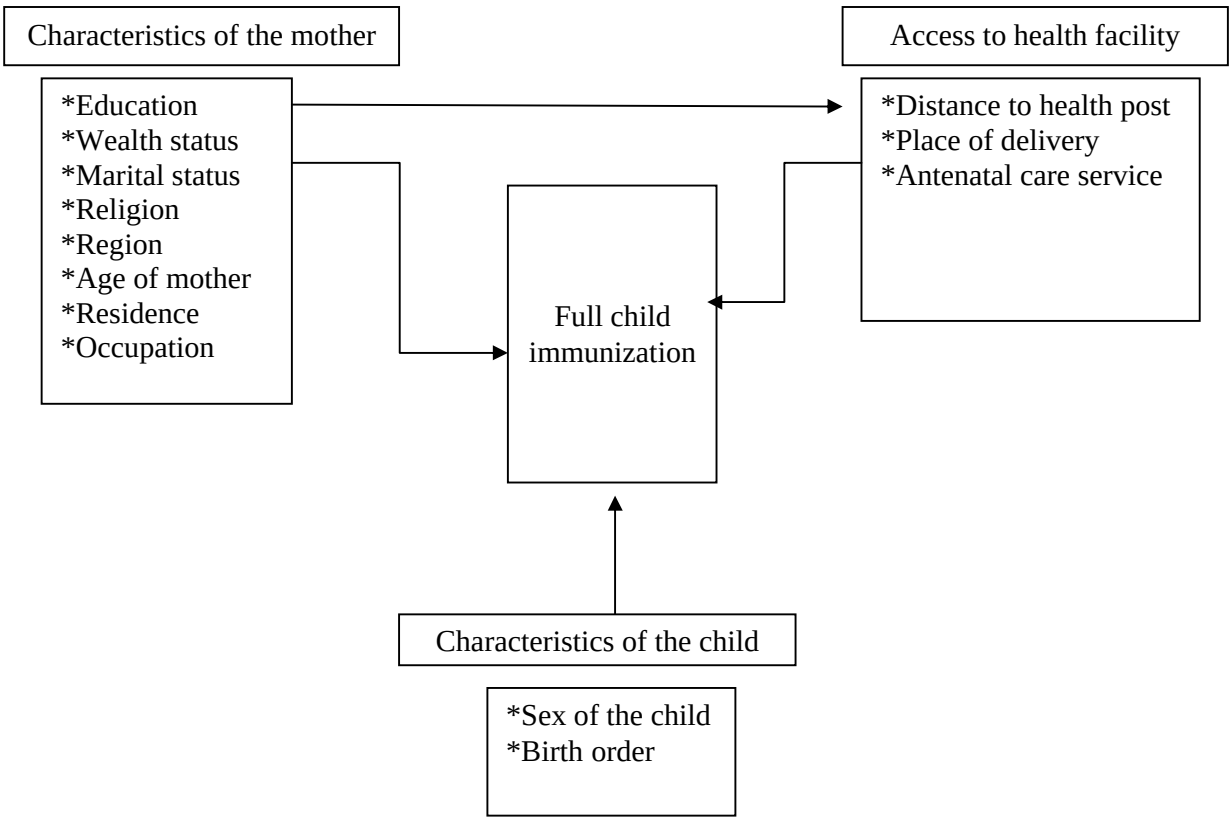

Fig 2: Conceptual framework for determinants of full child immunization of the children aged between12-23months.

Created by the author, 2012

2.8 HYPOTHESES

2.8.1. Maternal education positively predicts full child immunization in Nigeria. This is on the premise that education gives access to information to women.

2.8.2. Antenatal care is a significant predictor of full child immunization in Nigeria. This is because antenatal clinic creates room for women to be aware of immunization programme.

CHAPTER 3

METHODOLOGY

This section comprises the source of data, study population, sampling techniques, data analysis techniques, limitations of the study and ethical considerations.

3.1. DATA SOURCE:

This study made use of the 2008 Nigeria Demographic Health Survey (NDHS) children data. According to the study report, data on immunization was collected from vaccination cards and in cases where these were not available or a vaccination was not recorded on the card, the mother's recall of vaccination was accepted. During the 2008 survey, 33,385 women aged 15-49 were interviewed and 25,446 under-5 children were recorded for the women.

3.2. STUDY POPULATION:

The study population is composed of 4,520 children aged 12-23 months delivered by 4,520 women aged 15-49. These children were selected from the 25,446 children born to 33,385 women that participated in the 2008 NDHS in the five years before the survey.

3.3. SAMPLING DESIGN:

The 2008 Nigeria Demographic and Health Survey (NDHS 2008) is a nationally representative survey in which information was collected from 15,486 men aged 15-59 and 33,385 women aged 15-49. One of the major objectives of the survey was to provide up-to-date information on the percentage of child immunization coverage in Nigeria. The 2008 NDHS sample was selected using a stratified two-stage cluster design that consist 888 clusters, 286 in the urban and 602 in the rural areas. A representative sample of 36,800 households was selected for the 2008 NDHS survey to target a minimum of 950 completed interviews per state. In each state, the number of households was distributed proportionately among its urban and rural areas. In the second stage of selection, an average of 41 households was selected in each cluster. All women age 15-49 who

were either permanent residents of the households in the 2008 NDHS sample or visitors present in the households on the night before the survey were interviewed. Nigeria Demographic and Health Survey took place between June and October 2008.

3.4. DATA MANAGEMENT:

Data management methods

The study selected some variables expected to be associated with immunization status of children aged 12-23 months. Full child immunization (dependent variable) was derived from summing all the required vaccines (3 doses of DPT, 3 doses of Polio, a dose of BCG and a dose of measles vaccine. Thereafter, children less than age 12 and children greater than age 23 were also excluded. From this, the sample size was gotten. For each of the vaccines that needed to form full immunization, missing values that were coded 9 or 99 were dropped. Mothers that reported their children had received all these vaccines and children whose vaccines date were recorded on card was coded “1” while children who did not receive these vaccines were coded “0”.After this, a new variable was generated, and all vaccines were put together that is, replacement of the new variable was coded “0” if all the vaccines were coded “0” and new generated variable “1” if all vaccines were coded “1”. By so doing, the outcome variable “full immunization” was derived. Some of the independent variables used were also re categorized. The maternal education was initially categorized as no education, primary, secondary, higher. But re categorized and coded it as no education “0”, primary “1” and secondary and higher as “2”. Religion variable was re coded by making traditionalist and other religion as others. Catholic and Christians were summed as one category, and Islam remained. The mother’s age variable was re coded into the 10 years group. The wealth status was re coded by combining the poorest and the poorer into the poor category, the rich and the richer were also summed to form the rich and the middle class remains as middle class. The birth order was re coded into four which are 1 “0”, 2-3 “1”, 4-5 “2” and 6+”3”.The occupation variable was re coded into four

categories namely not working “0”, professional and manager “1”, Clerical and services were put in a group and coded “2” whiles manual skilled /unskilled, sales, agric employee were put into another group and was renamed as other and coded “3”. The antenatal care was originally a continuous variable but it was categorized into three e.g., no antenatal “0 “, at least 4 times visit “1” and more than 4 visits “2”.. Place of delivery was re categorized as Non health facility ‘0’ and health facility ‘1’. Availability and accessibility of health care which was distance to health post remained as not a big problem “0” and big problem “1”. This is shown in table 1 below.

VARIABLES AND DEFINITION:

Table 1: Showing variables and their definition

Variable	Definition & Categories:
Dependent variable:	
Full Childhood immunization	Received all the basic vaccines before the age of two(a dose of Bacille Calmette-Guerin (BCG) vaccine four doses of oral polio, three doses of DPT, and one dose of measles vaccine. This was gotten by merging all the variables on vaccine for children between 12-23 months old. No (0) Yes (1).
Characteristics of the child (Independent variables)	
Sex of child Birth order	Male (1)or Female(2) 1(0) 2-3(1), 4-5(2), 6+ (3)
Characteristics of the mother	

Maternal Education	Highest educational level. No education (0), Primary (1). Secondary and higher (2).
Wealth Index	Wealth status. Poor (0), Middle (1), Rich (2)
Residence	Urban (0) Rural (1)
Region	South West (0), North central (1), North east (2), North west (3), South east (4), South-South (6)
Religion	Christianity (0), Islam (1), Others (2
Marital status	Current marital status. Never married (0), Currently married (1) formally married(2)
Age of mother	Current Age in 10 year groups. 15-24(0), 25-34 (1), 35-44(2), 45+ (3)
Occupation	Type of employment. Not working (0), Professional, technical, manager (1) clerical and service (2) Others (3)
Access to health facility	
Place of delivery	Non health (0), Health facility (1)
Antenatal care	Visited health facility for pregnancy 4 time or above No antenatal visit (0) at least 4 times (1) 4

	times and above (2)
Availability and accessibility of health care	Distance to health post Big problem (1), Not a big problem (0)

3.5. STATISTICAL PACKAGE AND METHOD OF ANALYSIS:

Stata version 12 was used for the analysis of the research work.

For the first objective of the study which is to estimate the level of full immunization coverage among 12-23 months old in Nigeria, the bivariate descriptive analysis method was used to provide the percentage distributions of full child immunization status by selected characteristics of mother, child and health facility. At the second level of analysis, the bivariate analytical method was employed to know the association between each of the independent variable with the dependent variable.

At the third level of analysis, binomial logistic regression was done to identify the predictors of full child immunization. This is because the dependent variable is binary, The logistic regression equation used in this study is:

$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots \beta_n X_n$

Where Y_i= dependent variable; α= constant; β_i= Co-efficient; X_i= independent variables.

3.6 LIMITATION OF STUDY:

The major limitation of this study was recall bias because the data on immunization was collected from vaccination cards and in cases where these were not available or a vaccination was not recorded on the card, the mother's recall of vaccination was accepted and this may affect the result of the analysis. Also being a cross sectional study, it was not possible to establish whether the independent variables preceded the outcome, and thus cause and effect relationships are not

certain.

3.7 ETHICAL CONSIDERATION

This study is a secondary data analysis. Permission to use the DHS data in this study was sought and obtained from Macro International, Incorporated.

CHAPTER 4

RESULT

4.1 Introduction

This chapter presents findings of this study under selected characteristics of child, mother and access to health facility in relation to full immunization in Nigeria.

4.2 Socio demographic/economic characteristics of the study population

A total number of 4,520 mothers of children aged between 12-23 months old were included in this study. About 27% of the respondents live in urban areas while the remaining 73% were from the rural part of Nigeria. The age of the mother that took part in this study ranged from 15 to 49. Majority were between the age group 25-35 (50%), 29% were in the age group 15-24, 19% were in the range of 35-44 while the remaining 2% were people aged 45 and above. From the total number of mothers that participated in this study, 50% were without education, 22% had primary education while the remaining 28% had secondary and higher education. Most of the mothers were currently married (96%), while the remaining 4% were either never married or formerly married. Half of the mothers were poor (51%), 19% were at the middle class while the remaining 30 % were rich. Also, 60% of the mothers were into agriculture, sales, manual and unskilled labour, 33% were not working, 4% were into clerical and service job and 3% were into professional and managerial jobs. 28% were from North West region, 23% were from North East, 17% from North central, 12% from South South, 12% from South West and the remaining 9 % were from South East region of Nigeria. About 56% of the study population were Islam, 42% were Christian and the remaining 2 % were into other religion.

4.2.1 Characteristics of the child

A total number of 4,520 children aged between 12- 23 months were in this study. About 50% of them were male children and 50% were female children and majority of the children were second and third birth orders.

Table 2: Characteristics of the study children aged 12-23 months in Nigeria, 2008

Variables	Percentage (%)	Frequency (4,520)
1. Sex		
Male	49.7	2,248
Female	50.3	2,272
2. Birth order		
1	18	830
2-3	33	1,469
4-5	25	1,141
6+	24	1,080

Table 3: Frequency and percentage distribution of children aged 12-23 months that received full child immunization in Nigeria, 2008

CHARACTERISTICS OF THE MOTHER	OUTCOME VARIABLE		TOTAL
	FULL IMMUNIZATION (%)		N(4,520)
1. EDUCATION	NO (3,539)	YES (981)	
No education	59	16	2,248
Primary	21	26	1,009
Secondary& higher	20	58	1,263
2. OCCUPATION			
Not working	34	22	1,478
Professional, technical, manager	2	8	119
Clerical and service	3	8	167
Sales, agric employee, skilled and unskilled manual	61	63	2,756
3. RESIDENCE			
Urban	22	44	1,219
Rural	78	56	3,301
4.AGE OF MOTHER			
15-24	31	21	1,308
25-34	48	57	2,246
35-44	18	20	845
45+	3	2	121
5. MARITAL STATUS			
Never married	2	3	91
Currently married	96	95	4,341
Formerly married	2	2	88
6. RELIGION			
Christian	33	74	1,904
Islam	65	25	2,537
Others	2	1	79

7. WEALTH			
Poor	59	21	2,300
Middle	19	19	850
Rich	22	60	1,370
8. REGION			
South west	9	24	541
North central	15	22	759
North east	27	10	1,042
North west	34	7	1,272
South east	6	18	385
South south	9	19	321
CHARACTERSITICS OF THE CHILD			
1. BIRTH ORDER			
1	18	21	830
2-3	31	36	1,469
4-5	25	26	1,141
6+	26	17	1,080
2. SEX			
Male	50	48	2,278
Female	50	52	2,272
ACCESS TO HEALTH FACILITY			
1. PLACE OF DELIVERY			
Non health facility	78	35	3,105
Health facility	22	65	1,415
2.ANTENATAL CARE			
No antenatal visit	55	14	2,079
Less than 4 times	12	10	516
4 times and above	33	76	1,925
3. AVAILABILITY AND ACCESSIBILITY OF HEALTH CARE			
Big problem	44	28	1,832
Not a big problem	56	72	2,688

Sex of the child

Immunization uptake varies when it comes to sex of the child. Females are likely to receive full immunization than their male counterparts. Result from the survey indicates that 52 % of female children are fully immunized than male children (48%).

Birth order

In the table 3 above, 21 % of the children that were fully immunized were born to mothers that have one parity as at the time of survey, 36% belong to mothers that have 2 to 3 parities, 26% to mothers that have 4-5 parities and 17% to mothers that have 6 parities and more.

Maternal education

Out of the 4520 children in this study, about 58% of the children who received full immunization were born to mothers who had secondary and higher education, 26% with primary education and 16% with no education.

Wealth status

In the table 3 above, 60 % of the children that were fully immunized were from rich household, 19% from middle class and 21 % from poor household.

Religion

About 74 % of the children in this study were born to Christian homes, 25% to belong to the Islam families and 1% belonged to other religion group.

Region

About 22 % of children whose parents are from North central in Nigeria had received full immunization, 10 % from North East, 7% from North-West, 18% from South-East, 24% from South-west and 19% from South-south.

Place of residence

It was also recorded that 44% of the children that had received full immunization were from urban areas and 56% were from rural areas.

Occupation

It was revealed that 63% of children whose parents are into sales, agriculture, skilled and unskilled labour received full immunization in this study. 8 % belong to parents that are into clerical and service, 8% to professional, technical and manager parents and 22% belong to parents that were not working as at the time of survey.

Age of mother

From table 3 above, 21% of children whose mothers were between age 15-24 received full immunization, 57% belong to mothers who were ages 25-34, 20% belong to mothers who were between ages 35-44 and 2% belong to mothers who were age 45 and above.

Marital status

About 3% of the children born by people that are never married received full immunization, 95% belong to people that are currently married and 2 % belong that were formerly married.

Place of delivery

About 65% of the children that received full immunization in this study were found to be born at health facilities either in government hospitals or private hospitals or clinics while 35 % were born at non health facilities like the respondent homes.

Antenatal care use

Out of the 4,520 children, 76% of children whose mothers attended antenatal for four or more times received full immunization, 10% belong to mothers who attended less than four times and 14% belong to mothers who did not go for any antenatal visit.

Distance to health facility

About 28% of the children that were found to receive full immunization in this study were born to mothers who reported distance to health facility was a big problem while 72% belong to mothers who reported distance to health facility was not a big problem.

4.3 Factors associated with immunization status of the children

From table 4 below, the association of mothers'& child's characteristics and access to health facility with immunization status of the children was assessed using bivariate and multivariate analyses via logistic regression analysis.

In this study, mother's education shows an association with full immunization at the bivariate level. Out of 50% of children born to mothers without education, only 16% had received full immunization as at the time of survey. From the study population, 22% had primary education, in which 26% had their children fully immunized that is they were 5 times [Odd Ratio (OR)=4.57] more likely to vaccinate their children than mothers without education and out of 25% children born to mother that had secondary and higher education, 58% have received full immunization. This means they were 11 times [OR=10.9] more likely to be fully vaccinated than children born to mothers without education. In regards to the mother's occupation, children born to mothers that were into professional and managerial jobs were 8 times [OR=7.97] more likely to receive full immunization, clerical and service workers were 5 times [OR= 4.82] more likely to have their children fully immunized than mothers that were not working while children born to mothers that were into other types of job were 2 times [OR=1.67] more likely to receive full immunization than children born to mother that were not working.

On the other hand, children born to mothers that were from rural part of Nigeria were less likely [OR=0.36] to receive full immunization compare to their counter parts in the urban part of Nigeria.

A strong association was found between mother's wealth status and full immunization. Out of the 30 % that came from a rich household, 60% received full immunization. This means that the children were 7 times [OR=7.47] more likely to receive full immunization than children from poor household and out of the 19% children from a middle class, 19% also received full immunization. This implies that they were 3times [OR=2.87] more likely to receive full immunization than children from poor household. Religion was found to be associated with full immunization at the bivariate level. Out of the 56% Islam children in the study, only 25% of the children had received full vaccination. This means that Islam children were [OR=0.18] less likely to receive full immunization compared to children born by Christian mothers. Age of mother was also found to be associated with full child immunization in this study. Mothers between ages 25-34 and 35-44 were 2 times [OR=1.79 and 1.65] respectively more likely to have their children fully immunized compared to mothers in the age group 15-24. Region was also found to be statistically associated with full child immunization at the bivariate level. Children from Northern part of the country were found to be less likely to receive full immunization compared to children from the Southern and Eastern part of the country. Place of delivery was also found to be associated with full immunization at the bivariate level. Children born at any health facilities were 7 times [OR=6.53] more likely to receive full immunization than children born at non health facility. Distance to health facility was associated with full child immunization at this second level of analysis. Children whose mothers said distance to health facility was not a big problem were 7 times [OR=6.53] more likely to receive full immunization compared to children whose mothers said it was a big problem to get to health facility. Children whose mother attended antenatal clinic four times

or more were 9 times [OR=9.03] more likely to receive full immunization compared to children whose mothers didn't attend antenatal. But, birth order, sex of the child and marital status did not show any significant association with full child immunization at the bivariate level.

Table 4: Unadjusted and Adjusted odd ratio of determinant of full child immunization among 12-23 months in Nigeria, 2008

CHARACTERISTICS OF THE MOTHER	UNADJUSTED ODD RATIO (OR)	CONFIDENCE INTERVAL (95%)	ADJUSTED ODD RATIO (OR)	CONFIDENCE INTERVAL (95%)
Region				
South west	RC(1.00)		RC(1.00)	
North Central	0.51*	0.41-0.65	1.05	0.80-1.36
North East	0.13*	0.10-0.17	0.56*	0.41-0.78
North West	0.07*	0.06-0.10	0.49*	0.34-0.69
South East	1.03	0.79-1.34	1.15	0.85-1.56
South south	0.72	0.57-0.93	0.95	0.71-1.26
Education	+			
No education	RC(1.00)		RC(1.00)	
Primary education	4.46	3.59-5.53	1.41*	1.09-1.82
Secondary and Higher	10.99	9.03-13.38	1.87*	1.42-2.46
Age of mother	+			
15-24	RC(1.00)		RC(1.00)	
25-34	1.79*	1.50-2.14	1.22	0.96-1.55
35-44	1.65*	1.32-2.05	1.25	0.89-1.75
45+	1.20	0.74-1.95	1.82*	0.99-3.35
Occupation	+			
Not working	RC(1.00)		RC(1.00)	
Professional, technical, manager	7.98*	5.39-11.80	1.62*	1.04-2.54
Clerical and service	4.83	3.45-6.76	1.45	0.98-2.15
Sales, agric-employee, skilled and unskilled	1.67	1.41-1.98	1.15	0.93-1.41
Residence	+			
Urban	RC(1.00)		RC(1.00)	
Rural	0.36	0.31-0.42	0.98	0.80-1.20
Marital Status				
Never married	RC(1.00)		RC(1.00)	
Currently married	0.55	0.36-0.86	0.79	0.48-1.32
Formerly married	0.67	0.35-1.30	0.91	0.43-1.92
Wealth status	+			
Poor	RC(1.00)		RC(1.00)	
Middle	2.88*	2.32-3.57	1.34*	1.05-1.71
Rich	7.47*	6.25- 8.93	1.69*	1.31-2.19

Religion	+			
Christian	RC(1.00)		RC(1.00)	
Islam	0.18	0.15-0.21	0.54*	0.43-0.68
Other	0.18	0.09-0.39	0.48	0.22-1.08
CHARACTERISTICS OF THE CHILD				
Sex				
Male	RC(1.00)		RC(1.00)	
Female	1.09	0.92-1.29	1.09	0.92-1.29
Birth order	+			
1	RC(1.00)		RC(1.00)	
2-3	0.95	0.78-1.16	1.01	0.79-1.30
4-5	0.85	0.69-1.04	0.98	0.73-1.32
6+	0.52*	0.42-0.66	0.98	0.68-1.40
ACCESS TO HEALTH FACILITY				
Distance to health	+			
Facility			RC(1.00)	
Big problem	RC(1.00)		1.38*	
Not a problem	2.05*	1.76-2.40		1.14-1.66
Place of delivery	+			
Non health facility	RC(1.00)		RC(1.00)	
Health facility	6.53*	5.60-7.61	1.76*	1.45-2.13
Antenatal care	+			
No antenatal	RC(1.00)		RC(1.00)	
Less than 4 times	3.63*	2.76-4.79	2.09*	1.54-2.83
4 times and above	9.03*	7.42-10.9	3.22*	2.57-4.04

P <0.05=*, + means the variable was significant

4.4 Determinants of full child immunization.

Binomial logistic regression was used to identify the predictors of full child immunization aged 12-23 months in Nigeria. Table 4 presents the results of the logistic regression analysis. The table shows that maternal education, occupation and mother's age, region, religion, wealth status, distance to health facility, place of delivery, antenatal care use, were significant predictors of full child immunization in Nigeria.

The mother's level of education had a significant positive influence on the odds of the child being fully immunized. Children born to parents with primary level of education are more likely to receive full immunization (Adjusted odd ratio [AOR=1.41]) than children born to mothers with no education, while children born to mothers with secondary and higher are two

times more likely to receive full immunization than children of mothers with no education [AOR=1.87]. Immunization uptake increases as the mother's education increases.

The mother's age also had a positive influence on the odds of the child being fully immunized. Children of mothers aged 45 and above are more likely to be fully immunized [AOR=1.82] compared to children born to mothers aged 15-24.

Children of mothers who were working were more likely to be fully immunized compared to children born to mothers that are not working.

In this study, it was also found that wealth has a positive association with full child immunization. This means the higher the wealth status of the mother, the more likely it is for the child to be fully immunized. Children that belong to the wealthiest households have improved vaccination outcomes. Children born to the middle class parents are 1.8 times more likely to receive full immunization [AOR=1.82] compared to children born to the poor in Nigeria. Children born to rich parents are 1.7 times more likely to be fully immunized [AOR=1.69]. Children from North-east region were less likely [AOR=0.56] to receive full immunization compared to children from South west region of Nigeria. Also children in North-west region were also less likely to be fully immunized compared to children in the South west region [AOR=0.49].

A strong association between full immunization and religion was shown in this study. Children born by Islam parents were less likely to receive full immunization compared to children born by Christian parents [AOR=0.54].

Evidence of a strong statistical association was also found in place of delivery and Full immunization. Result showed that child born in health facilities were more likely to receive full immunization compared to those that were delivered at non health facilities like home [AOR=1.76]. Substantial evidence of a strong association between antenatal care and full immunization was also found. Likelihood of full immunization uptake increases with number

of ANC visits by the mother. Children whose mother attended antenatal less than four times were more likely to receive full immunization compared to children whose mother did not attend any ANC. [AOR=2.09]. In the same way, children born to mothers who attended ANC four times or more were more likely to receive full immunization [AOR=3.22, C.I=2.57-4.04].

Distance to the health facility strongly influenced the immunization status of a child. Children born to mother who think distance to health facility is not a problem were more likely to receive Full immunization compared to mother who think it is a big problem [AOR =1.38].

In conclusion, in this binomial logistic regression analysis, the sex of the child, birth order, marital status, place of residence (urban/ rural), were found not to be associated with full immunization status.

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CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATION

This study was done to identify predictors influencing full child immunization among 12-23 months old in Nigeria. The percentage of children that were fully immunized was found to be 22%. Comparing the immunization coverage of children between ages 12-23 months in Nigeria with that of NDHS 2003, the percent of children fully vaccinated is higher by 9%. It is also higher than the national immunization coverage survey that reported only 18% of children aged 12-23 months that were fully immunized as at 2006.

The significant predictors of full immunization in this study were maternal education, region, religion, wealth status, distance to health facility, place of delivery, antenatal care use, occupation and mother's age.

There was a strong positive association between maternal education and full immunization. Education helps to improve health seeking behaviour of an individual. This finding is consistent with other literatures like Tadesse et al., 2009 and Breiman et al., 2004, that found that maternal education was a significant predictor of completeness of immunization because highly educated mothers will be more aware of the importance of immunization. The role of maternal education as an important cause of immunization uptake has also been shown by Mahy, 2003 and Onyiriuka, 2005. In contrast, in study conducted in Libya by Mabrouka and Bofarraj in 2011, there was no significant relationship between immunization status and mothers' educational level.

Mothers' occupation is another factor that influences vaccination uptake. Occupation can influence mothers' likelihood to seek immunization for their child. This study showed that mothers' occupation (Professional and managers) was significantly associated with higher

likelihood of full immunization than people that are not working. Similar findings have been reported in previous studies (Antai, 2009).

Result also showed that there is evidence that ages of mother predicts child immunization. This could be because elder mothers know the effect and the importance of immunization on children than young women. This finding is the same with the study conducted in Sudan by Ibnouf et al., 2007 and also in the study conducted in Nigeria by Babalola 2009.

Several studies have found a true relationship between wealth status and vaccination status (INDEPTH NETWORK 2005; Ndiritu et al. 2006; Jamil et al., 1999 and Babalola, 2009). Children from wealthier households may be more likely to have their vaccination status checked and to receive missing doses of vaccines when attending a health care facility than children from poor households. Also it could be because children who are from poor homes find it difficult to be reached by the health workers and also parents may encounter barriers to reach health facility compared to rich children. In the study conducted by Castro-Leal, 1999 and Pande, 2003, they found no association between wealth status and full child immunization.

In previous studies conducted in other developing countries, distance to primary health care facilities significantly predicted vaccination status (Muller et al. 1998; Torun & Bakirci 2006). An association was found between distance to health facility and full child immunization in this present study. This was the same with the findings in the study conducted in Kenya by Mutua et al., 2011 and in India by Takum et al., 2011 and in Nigeria by Adedayo et al., 2009. This may be because parents may not be willing to walk long distances due to regular absence of health workers or unavailability of vaccine at the health facility. Another explanation could be visibility of health facility may act as a reminder to the parent.

As place of delivery was significant in this study, the same was found in the study conducted in Niger Delta area of Nigeria by Oyo-Ita et al., 2012. A child that is born in a health facility would have more access to immunization than a child born at a non health facility. At birth, a child is given Polio 0 and this makes the parent to be aware of immunization. Similar findings have been reported in previous studies (Luman et al., 2005 and Oladokun et al., 2009).

Also, this study shows that child whose mother attended antenatal clinic during pregnancy for four times and more are likely to get full immunization. This could be true because antenatal clinic is a mean for women to be aware of immunization programme (Mutua et al., 2011.). This is consistent with the finding in the research conducted by Adedayo et al., 2009 that showed that about 65% of the women got their awareness of immunization at the antenatal clinics.

Religion was also found to be significant. This is consistent with the result of the research conducted in Nigeria by Babalola 2009. Misconception by Muslims affects the immunization uptake in Northern Nigeria.

The six regions in Nigeria consist of different religious, population size and levels of development. These regional differences tend to affect the range of child immunization campaign effectiveness across the country (Antai, 2009) and which could be linked with differences in vaccine supply between areas within the different regions.

The gender of the child did not significantly affect the uptake of immunization in this present study and this is the same with the study carried out by Odusanya et al., 2008, Antai, 2009 Kidane et al., 2008 and Mabrouka and Bofarraj, 2011. Gender can predicts immunization status only if the child is from a society where gender inequality is prevalent.

Birth order could have a close relationship with immunization status but no association was found in this present study.

The relationship between rural/urban differential with full Child Immunization was also not found. This may be as a result of large number of rural children in the study area (73%) because the population of Nigeria is largely rural although, children from urban and rural areas are broadly different in the receipt of vaccines. Urban areas had the highest coverage rates for most vaccinations when taken separately, and the highest percentage of children who had received the full vaccines. This is probably partially due to the general distribution of healthcare facilities in the country, which tends to favour large number of people in the urban areas of the country. It could also be attributed to the lack of awareness of the importance of vaccination between mothers in rural areas in comparison to those in urban areas.

CONCLUSION

The result of this study has clearly indicated that mothers in Nigeria have improved on taking their children for immunization. This suggests that immunization uptake in the Nigeria has improved compared to previous reports. The challenge however is that most Muslims women, women without education, women that are poor seem not to still take their children for immunization and this affects the percentage of children fully immunized in Nigeria. This is because the majority of people in Nigeria belong to these groups. Concerned authorities should ensure that parents especially Muslim, uneducated and poor parents immunize their children since low coverage will always draw back the efforts of fighting vaccine preventable diseases. This calls for intervention towards helping these categories of mothers in Nigeria to know the advantage of taking their children to clinics for immunization.

RECOMMENDATION

Nigeria Government should improve on Supplemental immunization activities such as National Immunization Days (NIDs) and Catch-up campaigns that are already in place. These

programmes should be planned and regularly carried out based on how to improve routine immunization coverage and control out-breaks situations like Measles and Polio.

Nigeria health department should conduct immunization campaign frequently. Such a campaign should be specific communication focused on all the required vaccines.

Government should strengthen antenatal clinic by training more health care workers since this finding shows that children whose mothers attended antenatal clinics were fully immunized.

In addition, government should work with religious leaders especially in the Northern parts of the country so as to improve the uptake of vaccine.

Nigeria Ministry of health should make an effort to sensitize parents about the importance of completing the immunization schedule especially the Muslim parents.

Education programmes that can target poor and uneducated people should be put in place so that they are able to make informed decisions regarding immunization of their children.

Free health facilities should be made available to every mother so that poor mothers can easily access them.

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